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Per Hammarlund

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EXAMINER

CHEN, TE Y

ART UNIT

PAPER NUMBER

2161

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Please find below and/or attached an Office communication concerning this application or proceeding.

| | | | |
|------------------------------|--------------------------------------|--|--|
| Office Action Summary | Application No. 10/659,133 | Applicant(s) HAMMARLUND ET AL. | |
| | Examiner Susan Y. Chen | Art Unit 2161 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 23 February 2006.
2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 2-11, 13, 18 and 20 is/are pending in the application.
4a) Of the above claim(s) _____ is/are withdrawn from consideration.
5) ☐ Claim(s) _____ is/are allowed.
6) ☒ Claim(s) 2-11, 13, 18 and 20 is/are rejected.
7) ☐ Claim(s) _____ is/are objected to.
8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

Response to Amendment

This office action is in response to the amendment filed on Feb. 23, 2006.

Claims 2-11, 13, 18 and 20 are pending for examination, claims 1, 12, 14-17, 19 and 21-24 have been canceled and claims 2, 4, 11 and 18 have been amended.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 2-11, 13, 18 and 20, are rejected under 35 U.S.C. 103(a) as being unpatentable over Ebrahim et al. (U.S. Patent No. 5,644,753) in view of Arimilli et al. (U.S. Patent No. 5,867,511).

As to claim 2, Ebrahim et al. (hereinafter referred as Ebrahim) discloses an apparatus [e.g., col. 1, lines 8-16; Fig(s). 1 and 12 and associated texts], comprising:

- a) a resource having a plurality of elements [e.g., the units: 108, 109, 120, 134, 140, etc. Fig. 1];
- b) at least first and second components access the elements of the resource [e.g., the units 102-1 to 102-n, 108, etc. Fig. 1 and associated texts]

- c) an access controller [e.g., the unit 110, Fig. 1 and 5] coupled to the resource and the at least first and second components [e.g., the units 102-1 to 102-n, Fig. 1] to stored a first mask value [e.g., The UPANUM field 182, Fig. 5 and associated texts], wherein access to the elements of the resource by the first and second components is controlled based on the first mask value [e.g., col. 21, line 58 – col. 22, line 4 and col. 22, lines 8-10].

Ebrahim does not specifically disclose the elements of the resource are selectively partitioned and access the partitioned elements thereby.

However, Arimilli et al. (hereinafter referred as Arimilli) discloses the claimed features [e.g., col. 2, lines 8-58 & the Alternate Victim Selection Logic, Fig. 3 and associated texts].

Ebrahim and Arimilli are both in the same field to improving shared cache processing via memory mask, therefore, with the teachings of Ebrahim and arimilli in front of him/her, it would have been obvious for an ordinary skilled person in the art at the time the invention was made being motivated to combine the well-known technique as taught by Arimilli into Ebrahim's system, because by doing so, as suggested by Arimilli the combined system will be able to efficiently divide the cache into groups of blocks called a congruence classes and thereby choose a particular memory block for eviction in order to maintain high-speed cache coherency processing in a multiprocessor computer system [e.g., Arimilli: col. 1, lines 45-57 & col. 2, lines 8-58].

As to claim 3, except the features recited in claim 2, the combined system of Ebrahim and Arimilli further discloses that the first mask value represents which of the elements of the resource are available for access for a selected component [Ebrahim: col. 6, lines 23-39; col. 14, lines 39-57].

As to claim 4, Ebrahim discloses the features as claimed by applicant, comprising:

- a) a memory resource having a plurality of addressable blocks [e.g., Ebrahim: the units 108, 109, Fig. 1];
- b) first and second components adapted to access the memory resource [e.g., Ebrahim: the units: 104-1 to 104-n, 120-1 to 120-n, 110, 112, 132, 134-1 to 134-n, etc, Fig(s). 1 and 12 and associated texts]; and
- c) an access controller having a register adapted to store a first mask value, wherein access to addressable blocks of the memory resource is controlled based on the first mask value [e.g., Ebrahim: the System Controller (SC, 110, Fig. 5) includes SC ID register (180, Fig. 5) and SC Configure Register (190, Fig. 5) wherein, the register 180 stores the UPANUM mask field (182, Fig. 5) and the register 190 stores the Cache Index Mask (CIM) field 194 for the system controller 110 to address blocks of memory resource based on the first mask value (e.g., the UPANUM) and associated texts].

Ebrahim does not specifically disclose the addressable blocks of the resource are selectively partitioned and access the partitioned elements thereby.

However, Arimilli et al. (hereinafter referred as Arimilli) discloses the claimed features [e.g., col. 2, lines 8-58 & the Alternate Victim Selection Logic, Fig. 3 and associated texts].

Ebrahim and Arimilli are both in the same field to improving shared cache processing via memory mask, therefore, with the teachings of Ebrahim and arimilli in front of him/her, it would have been obvious for an ordinary skilled person in the art at the time the invention was made being motivated to combine the well-known technique as taught by Arimilli into Ebrahim's system, because by doing so, as suggested by Arimilli the combined system will be able to efficiently divide the cache into groups of blocks called a congruence classes and thereby choose a particular memory block for eviction in order to maintain high-speed cache coherency processing in a multiprocessor computer system [e.g., Arimilli: col. 1, lines 45-57 & col. 2, lines 8-58].

As to claim 5, except the features cited in claim 4, the combined system of Ebrahim and Arimilli further discloses that the memory resource is a cache memory [e.g., Ebrahim: Abstract, lines 1-5].

As to claim 6, except the features cited in claim 4, the combined system of Ebrahim and Arimilli further discloses that a processor couple to the cache memory, wherein the first component includes execution of instructions by the processor from a first thread and the second component includes execution of instructions by the processor from a second thread [e.g., Ebrahim: the unit 100, 102, Fig. 1 and associated

texts; col. 6, lines 14-22; col. 17, lines 61 – col. 18, line 26; Fig(s). 5-7 and associated texts].

As to claim 7, except the features cited in claim 6, the combined system of Ebrahim and Arimilli further discloses that the first mask value represent which of the addressable blocks of the cache memory are available for eviction [e, g., Ebrahim: col. 1, lines 53-60; col. 20, lines 59 – col. 21, line 11].

As to claim 8, except the features cited in claim 7, the combined system of Ebrahim and Arimilli further discloses that the first mask value is provided for each of the components to indicate which of the addressable blocks of the cache memory are available for eviction for at least two of the components [e.g., Ebrahim: col. 1, lines 53-60; col. 20, lines 59 – col. 21, line 11; col. 31, lines 5 – 42].

As to claim 9, except the features cited in claim 7, Ebrahim further discloses an eviction array [e.g., the units: 132, 134, Fig. 1 and associated texts] and a second mask for selecting which bit of the eviction array are used for controlling which of the addressable blocks of the cache memory are available for eviction [e.g., the unit 194, Fig. 6 and associated texts].

Ebrahim did not specifically disclose that the eviction array is indicating the least recently used addressable block of the cache memory.

However, Arimilli et al. (hereinafter referred as Arimilli) discloses [col. 2, lines 39-58; the units: 44, 46, etc Fig. 2 and associated texts].

Ebrahim and Arimilli are both in the same field to process cache memory via memory mask, therefore, with the teachings of Ebrahim and arimilli in front of him/her, it would have been obvious for an ordinary skilled person in the art at the time the invention was made being motivated to combine the well-known technique as taught by Arimilli into Ebrahim's system, because by doing so, as suggested by Arimilli the combined system will perform a must "evict" action when all of the blocks in a congruence class for a given cache are full, such that the combined system will free from memory crash. [e.g., col. 2, lines 39-58].

As to claim 10, Ebrahim discloses all limitations of claim 6, furthermore, he discloses the claimed the first mask value is an auxiliary mask value for represents which of the addressable blocks of the cache memory are available for the system to support [e.g., the UPANUM mask filed (182, Fig. 5), Fig. 6, col. 21, lines 21 – col. 23, lines 40].

Ebrahin did not expressly discloses a eviction array wherein an auxiliary mask value for indicating and selecting the least recently used addressable block of the cache memory to evict.

However, Arimilli) discloses the claimed features [e.g., Arimilli: Fig. 3 and associated texts].

Thus, Ebrahim and Arimilli are both endeavor to optimize the process of cache memory via memory masks, therefore, with the teachings of Ebrahim and arimilli in front of him/her, it would have been obvious for an ordinary skilled person in the art at the time the invention was made being motivated to combine the well-known technique as taught by Arimilli into Ebrahim's system, because by doing so, as suggested by Arimilli the combined system will perform real time "evict" action based on the evaluation of mask values to determine the cache hit/miss when all of the blocks in a congruence class for a given cache are full, such that the combined system will free from memory crash. [e.g., col. 2, lines 39-58; col. 7, line 41-52].

As to claims 11, 13, 18 and 20, these claims recite the same subject matter as claims 2-8 in form of method and computer program product, hence are rejected for the same reason.

Response to Arguments

Applicant's arguments with respect to claims 2-11, 13, 18 and 20, have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

To expedite the process of examination, the examiner requests that all future correspondences in regard to overcoming prior art rejections or other issues (e.g. 35 U.S.C. 112) set forth by the Examiner prior to the office action, that applicant should

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provide and link to the most specific page and line numbers of the disclosure where best support is found (see 35 U.S.C. 132).

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Susan Y. Chen whose telephone number is 571-272-4016. The examiner can normally be reached on Monday - Friday from 7:00-4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jeff Gaffin can be reached on 571-272-4146. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Susan Y Chen
Examiner
Art Unit 2161

May 16, 2006



UYEN LE
PRIMARY EXAMINER